

METHOD OF CHEMICAL MODIFICATION OF STRUCTURE TOPOGRAPHY

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ABSTRACT OF THE DISCLOSURE

10 A method is provided for filling high aspect ratio
gaps without void formation by using a high density
plasma (HDP) deposition process with a sequence of
deposition and hydrogen etch steps. The first step
uses an etch/dep ratio less than one to quickly fill
the gap. The first step is interrupted before the
opening to the gap is closed. The second step uses a
15 hydrogen-based plasma to chemically etch the deposited
material to widen the gap. The second step is stopped
before corners of the elements forming the gaps are
exposed. These steps can be repeated until the aspect
ratio of the gap is reduced so that void-free gap-fill
20 is possible. The etch/dep ratio and duration of each
step can be optimized for high throughput and high
aspect ratio gap-fill capacity.